Standards of Learning
Content Review Notes

Grade 7 Mathematics
1st Nine Weeks, 2018-2019
DOE has not released final version of Spring 2019 formula sheet.

### Geometric Formulas

- **Square**
  - Perimeter: $p = 4s$
  - Area: $A = s^2$

- **Rectangle**
  - Perimeter: $p = 2l + 2w$
  - Area: $A = lw$

- **Triangle**
  - Area: $A = \frac{1}{2}bh$

- **Circle**
  - Circumference: $C = 2\pi r$
  - Area: $A = \pi r^2$

- **Cube**
  - Volume: $V = lwh$
  - Surface Area: $S.A. = 2lw + 2lh + 2wh$

- **Cylinder**
  - Volume: $V = \pi r^2h$
  - Surface Area: $S.A. = 2\pi r^2 + 2\pi rh$

### Abbreviations

<table>
<thead>
<tr>
<th>Metric</th>
<th>Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>milligram</td>
<td>mg</td>
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<tr>
<td>gram</td>
<td>g</td>
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<tr>
<td>kilogram</td>
<td>kg</td>
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<td>milliliter</td>
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<td>liter</td>
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<tr>
<td>kiloliter</td>
<td>kl</td>
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<tr>
<td>millimeter</td>
<td>mm</td>
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<tr>
<td>centimeter</td>
<td>cm</td>
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<tr>
<td>meter</td>
<td>m</td>
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<tr>
<td>kilometer</td>
<td>km</td>
</tr>
<tr>
<td>square centimeter</td>
<td>cm$^2$</td>
</tr>
<tr>
<td>cubic centimeter</td>
<td>cm$^3$</td>
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<tr>
<td>ounce</td>
<td>oz</td>
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<tr>
<td>pound</td>
<td>lb</td>
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<tr>
<td>quart</td>
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<td>gallon</td>
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<td>inch</td>
<td>in.</td>
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<tr>
<td>foot</td>
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<tr>
<td>yard</td>
<td>yd</td>
</tr>
<tr>
<td>mile</td>
<td>mi</td>
</tr>
<tr>
<td>square inch</td>
<td>in$^2$</td>
</tr>
<tr>
<td>square mile</td>
<td>m$^2$</td>
</tr>
<tr>
<td>cubic inch</td>
<td>in$^3$</td>
</tr>
<tr>
<td>cubic foot</td>
<td>ft$^3$</td>
</tr>
</tbody>
</table>

### Mathematical Constants

- **Pi (\pi)**
  - Approximate: $\pi \approx 3.14$
  - Exact: $\pi \approx \frac{22}{7}$
Mathematics
Content Review Notes
Grade 7 Mathematics: First Nine Weeks
2018-2019

This resource is intended to be a guide for parents and students to improve content knowledge and understanding. The information below is detailed information about the Standards of Learning taught during the 1st grading period and comes from the Mathematics Standards of Learning Curriculum Framework, Grade 7 issued by the Virginia Department of Education. The Curriculum Framework in its entirety can be found at the following website:


SOL Practice Items provided by the VDOE,
http://www.doe.virginia.gov/testing/sol/standards_docs/mathematics/index.shtml
Answers are located on the last page of the booklet.

SOL 7.1
The student will
a) investigate and describe the concept of negative exponents for powers of ten;
   b) compare and order numbers greater than zero written in scientific notation;
      (*non-calculator);
   c) compare and order rational numbers (*non-calculator);
   d) determine square roots of perfect squares (*non-calculator); and
   e) identify and describe absolute value for rational numbers.

- Negative exponents for powers of 10 are used to represent numbers between 0 and 1.
  (e.g., \(10^{-3} = \frac{1}{10^3} = 0.001\))

- Negative exponents for powers of 10 can be investigated through patterns such as:
  \[
  10^2 = 100 \\
  10^1 = 10 \\
  10^0 = 1 \\
  10^{-1} = \frac{1}{10} = 0.1 \\
  \]

- A number followed by a percent symbol (%) is equivalent to that number with a denominator of 100.
  (e.g., \(\frac{3}{5} = \frac{60}{100} = 0.60 = 60\%)\)


- Scientific notation is used to represent very large or very small numbers.
- A number written in scientific notation is the product of two factors — a decimal greater than or equal to 1 but less than 10, and a power of 10 (e.g., \(3.1 \times 10^5 = 310,000\) and \(2.85 \times 10^{-4} = 0.000285\)).

Numbers can be written in standard form and in scientific notation.

**Standard Form:** 6,800,000,000,000  
**Scientific Notation:** \(6.8 \times 10^{12}\)

Numbers written in scientific notation are made up of three parts: the coefficient, the base, and the exponent.

6.8 \(\times\) 10\(^{12}\)

- **Coefficient** must be greater than or equal to 1 and less than 10.
- **Base** is always 10.
- **Exponent** shows the number of decimal places that the decimal needs to be moved to change the number to standard notation. (A negative exponent indicates that the decimal is moved to the left when changing to standard notation.)

- Equivalent relationships among fractions, decimals, and percents can be determined by using manipulatives. (e.g., fraction bars, Base-10 blocks, fraction circles, graph paper, number lines and calculators)
- A square root of a number is a number which, when multiplied by itself, produces the given number. (e.g., \(\sqrt{121}\) is 11 since \(11 \times 11 = 121\))
- The square root of a number can be represented geometrically as the length of a side of the square.
- The absolute value of a number is the distance from 0 on the number line regardless of direction. The absolute value of a number will always be positive. (e.g., \(|-\frac{1}{2}| = \frac{1}{2}\))
Examples:

1. Which would best describe the value of $10^{-2}$?
   A. Its value is greater than 100
   B. Its value is less than 10
   C. Its value is exactly 100
   D. Its value is exactly 10

   $10^{-2} = 0.01$
   Answer: B. Its value is less than 10

2. Which would be equivalent to 3,960,000 in scientific notation?
   A. $3.96 \times 10^6$
   B. $3.96 \times 10^5$
   C. $3.96 \times 10^3$
   D. $3.96 \times 10^2$

   Answer: A – The decimal place would move 6 places to the left

3. Which has the same value as $|−5|$?
   A. $-5$
   B. 5
   C. $\frac{1}{5}$
   D. $−\frac{1}{5}$

   The absolute value of a number is the distance from 0 on the number line.

   Answer: B. 5
4. What is the same value as $\sqrt{36}$?

<table>
<thead>
<tr>
<th>Square Root</th>
<th>Symbols: V or $\sqrt{}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\sqrt{4} = 2$</td>
<td>$2^2$ or $2 \times 2 = 4$</td>
</tr>
<tr>
<td>$\sqrt{9} = 3$</td>
<td>$3^2$ or $3 \times 3 = 9$</td>
</tr>
<tr>
<td>$\sqrt{16} = 4$</td>
<td>$4^2$ or $4 \times 4 = 16$</td>
</tr>
<tr>
<td>$\sqrt{25} = 5$</td>
<td>$5^2$ or $5 \times 5 = 25$</td>
</tr>
<tr>
<td>$\sqrt{36} = 6$</td>
<td>$6^2$ or $6 \times 6 = 36$</td>
</tr>
</tbody>
</table>

Answer: 6

5. Arrange the numbers from least to greatest.

$18\%, \ .95, \ \frac{1}{4}, \ 22.7\%, \ \frac{6}{5}, \ 0.4$

Answer: $18\%, \ 22.7\%, \ \frac{1}{4}, \ 0.4, \ .95, \ \frac{6}{5}$
SOL Practice Items provided by the VDOE, [http://www.doe.virginia.gov/testing/sol/standards_docs/mathematics/index.shtml](http://www.doe.virginia.gov/testing/sol/standards_docs/mathematics/index.shtml) Answers are located on the last page of the booklet.

SOL 7.1 (Negative Exponents; Absolute Value; Square Roots; Scientific Notation; Fractions, Decimals, and Percents)

1. Which list is ordered from least to greatest?

   \[ \begin{align*}
   F & : \frac{3}{8}, \frac{5}{6}, \frac{2}{9}, \frac{7}{11} \\
   H & : \frac{7}{11}, \frac{2}{9}, \frac{5}{6}, \frac{3}{8} \\
   G & : \frac{2}{9}, \frac{3}{8}, \frac{7}{11}, \frac{5}{6} \\
   J & : \frac{5}{6}, \frac{7}{11}, \frac{3}{8}, \frac{2}{9}
   \end{align*} \]

2. Which number is less than 138%?

   \[ \begin{align*}
   A & : \frac{13}{8} \\
   B & : 1\frac{1}{8} \\
   C & : 1.75 \\
   D & : 1.25 \times 10^2
   \end{align*} \]

3. The speed of light is approximately 300,000,000 meters per second. What is the speed of light expressed in scientific notation?

   \[ \begin{align*}
   F & : 3.0 \times 10^6 \text{ m/s} \\
   G & : 3.0 \times 10^7 \text{ m/s} \\
   H & : 3.0 \times 10^8 \text{ m/s} \\
   J & : 3.0 \times 10^9 \text{ m/s}
   \end{align*} \]

4. Which set is ordered from least to greatest?

   \[ \begin{align*}
   F & : \{16\%, \frac{1}{6}, 1.6 \times 10^6, 0.166\} \\
   G & : \{16\%, 0.166, \frac{1}{6}, 1.6 \times 10^5\} \\
   H & : \{1.6 \times 10^6, 16\%, \frac{1}{6}, 0.166\} \\
   J & : \{1.6 \times 10^6, \frac{1}{6}, 0.166, 16\%\}
   \end{align*} \]
5. Which of the following is another way of expressing 2 out of 8?

F  2.5%
G  25%
H  2.5
J  25

6. Which list is in order from least to greatest?

A  0.17, 40%, \( \frac{2}{3} \), \( \frac{5}{8} \), 0.78
B  0.17, 40%, \( \frac{5}{8} \), \( \frac{2}{3} \), 0.78
C  0.78, \( \frac{5}{8} \), \( \frac{2}{3} \), 40%, 0.17
D  0.78, \( \frac{2}{3} \), \( \frac{5}{8} \), 40%, 0.17

7. The fraction \( \frac{1}{8} \) is equivalent to –

F  0.012%
G  0.125%
H  12.5%
J  125%

8. Which number is equivalent to 0.7%?

F  0.007
G  0.07
H  7
J  70

9. Which is true?

F  30\% = \frac{3}{100}
G  \frac{3}{50} = 0.06
H  \frac{30}{1,000} = 0.30
J  60\% = \frac{3}{50}
10. Which is correctly written in scientific notation?

A $5.6 \times 10^6$
B $56 \times 10^5$
C $5,600,000$
D 56 million

11. A store advertisement reads “Going Out of Business Sale. Everything is $\frac{5}{8}$ off.” What percent is $\frac{5}{8}$?

F 16%
G 37.5%
H 58%
J 62.5%

12. Daphne wrote the fractional part of the quizzes she answered correctly. Which lists these quiz scores in order from least to greatest?

<table>
<thead>
<tr>
<th>Quiz</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$\frac{4}{5}$</td>
</tr>
<tr>
<td>2</td>
<td>$\frac{5}{11}$</td>
</tr>
<tr>
<td>3</td>
<td>$\frac{3}{7}$</td>
</tr>
<tr>
<td>4</td>
<td>$\frac{7}{9}$</td>
</tr>
</tbody>
</table>

F $\frac{3}{7}$, $\frac{4}{9}$, $\frac{5}{11}$, $\frac{7}{9}$
G $\frac{4}{5}$, $\frac{5}{7}$, $\frac{7}{9}$, $\frac{11}{11}$
H $\frac{3}{7}$, $\frac{5}{9}$, $\frac{4}{11}$, $\frac{5}{5}$
J $\frac{3}{7}$, $\frac{5}{11}$, $\frac{7}{9}$, $\frac{5}{5}$

13. What is a square root of 100?

F 50
G 25
H 10
J 4

14. Which is a perfect square between 81 and 121?

A 86
B 99
C 100
D 114
15. Which of these is a true statement?

A. \(2 \times 10^{-2} > 2 \times 10^2\)
B. \(3.1 \times 10^3 = 3,100\)
C. \(2.5 \times 10^{-2} = 250\)
D. \(0.235 < 2.35 \times 10^{-2}\)

16. Which statement is true?

A. \(0.09 > \frac{7}{8}\)
B. \(6\% < 0.09\)
C. \(\frac{7}{8} < 8.0 \times 10^{-3}\)
D. \(8.0 \times 10^{-3} > 6\%\)

17. Which expression is equivalent to \(10^{-5}\)?

a) \(10 \cdot 10 \cdot 10 \cdot 10 \cdot 10\)

b) \(\left(\frac{1}{10}\right) \cdot \left(\frac{1}{10}\right) \cdot \left(\frac{1}{10}\right) \cdot \left(\frac{1}{10}\right)\)

c) \((-10) \cdot (-10) \cdot (-10) \cdot (-10) \cdot (-10)\)

d) \((-\frac{1}{10}) \cdot (-\frac{1}{10}) \cdot (-\frac{1}{10}) \cdot (-\frac{1}{10}) \cdot (-\frac{1}{10})\)

18. Use the given numbers to find an equivalent fraction and decimal.

19. Select all of these that are equivalent to \(10^{-5}\).

\[
\begin{array}{ccc}
\frac{1}{100} & \frac{1}{200} & \frac{-1}{100} \\
\frac{-1}{200} & -0.02 & -0.01 \\
& 0.02 & 0.01 \\
\end{array}
\]
20. Which fraction and decimal are equivalent to $10^{-2}$?
   a) $-\frac{1}{10^2}$ and $-0.02$
   b) $\frac{1}{10^2}$ and $0.02$
   c) $-\frac{1}{10^2}$ and $-0.01$
   d) $\frac{1}{10^2}$ and $0.01$

21. Arrange the four numbers shown in order from least to greatest.
   
   $\begin{array}{cccc}
   6.7\% & 0.67 & \frac{6}{9} & 6.7 \times 10^{-3}
   \end{array}$

22. Which number is greater than $1\frac{2}{3}$?
   a) 1.34
   b) 166 %
   c) $\frac{7}{3}$
   d) $1.6 \times 10^0$

23. Identify each true statement.
   
   $\begin{array}{ccc}
   9 = |9| & 4.1 = |-4.1| & -3 = |3|
   |\frac{2.5}{2.6} = 2.6 & |7| = 7 & |-8.5| = 8.5
   \end{array}$
SOL 7.2 The student will solve practical problems involving operations with rational numbers.

- The set of rational numbers includes the set of all numbers that can be expressed as fractions in the form \( \frac{a}{b} \), where \( a \) and \( b \) are integers and \( b \) does not equal zero. The decimal form of a rational number can be expressed as a terminating or repeating decimal. A few examples of rational numbers are: \( \sqrt{25}, \frac{1}{4}, -2.3, 82, 75\%, 4.\overline{59} \).

- Proper fractions, improper fractions, and mixed numbers are terms often used to describe fractions. A proper fraction is a fraction whose numerator is less than the denominator. An improper fraction is a fraction whose numerator is equal to or greater than the denominator. An improper fraction may be expressed as a mixed number. A mixed number is written with two parts: a whole number and a proper fraction (e.g., \( 3\frac{5}{8} \)). A fraction can have a positive or negative value.

The student will use problem solving, mathematical communication, mathematical reasoning, connections, and representations to

- Solve practical problems involving addition, subtraction, multiplication, and division with rational numbers expressed as integers, fractions (proper or improper), mixed numbers, decimals, and percents. Fractions may be positive or negative. Decimals may be positive or negative and are limited to the thousandths place.

Example 1:
Mark owes his sister $10. He earned $15 for washing the car. He gave \( \frac{1}{5} \) of his earnings to a local charity and then paid his sister. Does Mark have enough to repay his sister the full amount? Why or why not?

Step 1 Find \( \frac{1}{5} \) of his earnings for charity \( \frac{1}{5} \cdot 15 = 3 \)

Step 2 Subtract what he is giving charity from his earnings. \( 15 - 3 = 12 \)

Step 3 Mark owes his sister $10. \( 12 - 10 = 2 \)

Mark can pay his sister and have $2 left over

Example 2
The seventh-graders at the middle school are going on a field trip to the science museum. They will spend \( 3\frac{1}{2} \) hours at the museum. The students will need to visit six exhibits while they are there. If the time is evenly distributed, how many minutes will the students spend at each exhibit?

Step 1 Calculate the number of minutes spent at the museum
There are 60 minutes in an hour \( 3\frac{1}{2} \cdot 60 = 210 \) minutes

Step 2 Divide the number of minutes spent at the museum by the number of exhibits that students need to visit.
\( \frac{210}{6} = 35 \)

The students can spend 35 minutes at each exhibit
1. Today’s high temperature in Richmond was 8°F and the low temperature was 12.6°F lower than this. Yesterday’s low temperature was 5°F. **What was the difference between the two low temperatures?**

2. An industrial factory makes $6\frac{2}{5}$ yards of chain every minute. The cost of each yard of chain is $7.20. **What is the total cost for all chain produced in 20 minutes?**

3. Kelly had $-15 in her checking account. She did a few chores and made $38.50. She decided to pay for her and a friend to go to the movies, and each ticket cost $7.75. **How much money does she have left in her checking account?**

7. There are 32 students in Mrs. Edward’s class, and $\frac{1}{4}$ of the class has their own cellphone. Of this group of students, $\frac{1}{2}$ of them are allowed to use social media. **How many of the students have a cellphone and can use social media?**
Math Smarts!
Math + Smart Phone = Math Smarts!

Need help with your homework? Wish that your teacher could explain the math concept to you one more time? This resource is for you! Use your smartphone and scan the QR code and instantly watch a 3 to 5 minute video clip to get that extra help. (These videos can also be viewed without the use of a smartphone. Click on the links included in this document.)

**Directions:** Using your Android-based phone/tablet or iPhone/iPad, download any QR barcode scanner. How do I do that?
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*It’s mobile math help when you need it!* So next time you hear, “You’re always on that phone” or “Put that phone away!” you can say “It’s homework!!”

[QR Code]

Access this document electronically on the STAR website through Suffolk Public Schools.  
(http://star.spsk12.net/math/MSinstructionalVideosQRCodes.pdf)

**PLEASE READ THE FOLLOWING:**
This resource is provided as a refresher for lessons learned in class. Each link will connect to a YouTube or TeacherTube video related to the specific skill noted under “Concept.” Please be aware that advertisements may exist at the beginning of each video.
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<table>
<thead>
<tr>
<th>SOL</th>
<th>Link</th>
<th>QR Code</th>
</tr>
</thead>
</table>
| 7.1 | Order fractions, decimals, and percents  
http://www.youtube.com/watch?v=PZDg0_djUtE | ![QR Code](image1) |
| 7.1 | Determine and model absolute value  
http://tinyurl.com/q86jijyh | ![QR Code](image2) |
| 7.1 | Square roots  
http://www.youtube.com/watch?v=Ymcf14wC9Ck | ![QR Code](image3) |
| 7.1 | Scientific Notation (negative exponents begin at 3:00)  
https://www.youtube.com/watch?v=WwmJ5nMmiqQ | ![QR Code](image4) |
| 7.1 | Powers of 10  
http://www.bvps.org/mfischer/Videos.htm | ![QR Code](image5) |
Released Test Answers (1st Nine Weeks)

SOL 7.1 (Negative Exponents; Absolute Value; Square Roots; Scientific Notation; Fractions, Decimals, and Percents)

1. G  
2. B  
3. H  
4. J  
5. G  
6. B  
7. H  
8. F  
9. A  
10. G  
11. J  
12. J  
13. H  
14. C  
15. B  
16. B  
17. B  
18. $10^{-2} = \frac{1}{100} = 0.01$

SOL 7.2 Practical Problems

1. 9.6°  
2. $921.60$  
3. $8$  
4. 4

19. $rac{1}{100,000} = \frac{1}{10000} = 0.00001$

20. D

21. $6.7 \times 10^{-3} \quad 6.7\% \quad \frac{6}{9} \quad 0.67$

22. C

23. $|9| = 9 \quad |4.1| = 4.1 \quad |-8.5| = 8.5$